

SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Part 3 (3C)

Author: Mrs. Ornella Bombaci

Thales Alenia Space Italia, Italy, ornella.bombaci@thalesaleniaspace.com

Mr. Renato Croci

Thales Alenia Space Italia, Italy, renato.croci@thalesaleniaspace.com

Mr. Marco Iorio

Thales Alenia Space Italia, Italy, marco.iorio@thalesaleniaspace.com

Ms. Elisa Pietropaoli

Thales Alenia Space Italia, Italy, elisa.pietropaoli@thalesaleniaspace.com

Mr. Olivier Bayle

European Space Agency (ESA), The Netherlands, olivier.bayle@esa.int

Mr. Alistair Winton

European Space Agency (ESA), The Netherlands, alistair.winton@esa.int

Mr. Giuseppe Lippolis

Thales Alenia Space Italia, Italy, giuseppe.lippolis@thalesaleniaspace.com

Mr. Francesco Barletta

Thales Alenia Space Italia, Italy, francesco.barletta@thalesaleniaspace.com

EXOMARS RDA – RADAR DOPPLER FOR MARS LANDING PURPOSES

Abstract

This paper describes the key features, design constraints and challenges of the Ka band Radar Doppler Altimeter embarked on the EXOMARS Entry Descent and Landing Demonstrator Module (EDM). The Radar Doppler will support the EDM during the landing phase on the Mars Surface. It is designed and manufactured by Thales Alenia Space Italia (TAS-I) under the responsibility of the European Space Agency (ESA). The RDA includes four Ka-band antennas, a routing network, RF transmitter and receiver together with processing electronics which will provide slant range and ground relative velocity along each antenna beam, which will allow the reconstruction of the EDM altitude and Mars surface relative horizontal and vertical velocity by the EDM software. The design of the RDA is driven by challenging constraints on mass, volume, power consumption and specific operational and environment requirements related to the Mars landing conditions. The scope of this paper is to present the techniques used to face the requirement envelope with a wide look at the predicted performances and the design solutions to accomplish them. The paper also provides an outlook on the performance verification activities planned for the RDA..

Keywords: MARS landing; radar signal on board processing; doppler analysis, Microbiological reduction